MICHIGAN HEALTH & HOSPITAL ASSOCIATION

Advocating for hospitals and the patients they serve.

Testimony
Michigan House Health Policy Committee
June 14, 2007
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MHA Keystone Center for Patient Safety & Quality

Chairperson Angerer, and members of the committee, thank you for the opportunity to address you today and share news of groundbreaking efforts by Michigan's hospitals who are leading the nation in the field of health care patient safety and quality improvement.

My name is Sam Watson and I am executive director of the Michigan Health & Hospital Association Keystone Center for Patient Safety & Quality.

In 1999, the Institute of Medicine published a report – ***To Err is Human*** – which concluded that an estimated 44,000 to 98,000 people lose their lives annually as a result of medical error.

Additionally, these errors result in excess and avoidable health care spending amounting to between 17 and 29 billion dollars.

This report galvanized the health care system to address the need for change. After thoughtful and deliberate planning, the MHA Keystone Center for Patient Safety & Quality was created in the spring of 2003 with the mission of expediting the translation of evidence-based care into practice at the bedside as well as supporting culture change in hospitals.

It is through the MHA Keystone Center's unique ability to voluntarily bring together Michigan's 146 nonprofit community hospitals, physicians and other care providers, as well as patient safety experts, such as Johns Hopkins University, in a partnership to address health care quality in our state. In the short years since, Michigan hospitals have demonstrated that an enhanced culture of safety and communication — along with the application of

evidence-based best practices — can produce significant, meaningful and measurable results: ultimately improving health care and saving lives.

The idea of ***evidence-based best practice*** is the use of methods rooted in science that have been used to evaluate a process to ensure the best prediction of outcomes in medical treatment. Then, once applied in every day practice, these processes are then determined to be more effective at delivering a particular outcome than any other technique, and with the proper processes, checks, and testing, a task can be completed with fewer problems and unforeseen complications.

MHA Keystone Center for Patient Safety & Quality is a 501(c)(3) organization operated by the Michigan Health & Hospital Association and has been funded to date by a combination of MHA-member hospitals and funding from public and private

grants including the state and federal government. The MHA Keystone Center continues to improve patient safety and the quality of health care delivery through the application of science and implementation of evidence-based best practice to save lives and reduce costs.

As a neutral and unifying entity, MHA Keystone Center is uniquely positioned to voluntarily bring large numbers of hospitals, physicians and other care providers together in a single improvement initiative while providing a non-competitive environment. Michigan hospitals are then able to collaborate *freely*. The results of their voluntary and committed efforts over the past four years have challenged tradition, raising the bar for health care quality and showing hospitals that perfect *is* possible.

This approach reduces the likelihood of harm and increases reliability in how care is delivered. It also has a direct effect on

changing the organizational culture to one that believes harm is untenable.

The efforts and success of the MHA Keystone Center have been recognized by *Crain's Detroit Business* which awarded the MHA Keystone Center a 2006 *Crain's Health Care Heroes Award* for outstanding advancement in health care. Additional accomplishments have been reported by media outlets including *The Detroit News, Modern Healthcare*, the *Associated Press*, *Detroit Free Press*, *Newsweek* and the *New England Journal of Medicine*.

MHA Keystone currently coordinates four major partnerships and initiatives — *Keystone: ICU* to improve patient treatment and safety in intensive care units; *Keystone: Hospital-Associated Infections* — also known as HAI — to reduce the occurrence of infections; *Keystone: Gift of Life* to boost organ donations in

Michigan and save lives; and *Keystone: Surgery* to minimize the risk of surgical site infections and unanticipated events.

I'd like to take a moment and briefly explain each of these initiatives so that you might get a better understanding of not only the scope and scale of each, but also their significant impacts to date.

Since the founding of MHA Keystone, the *Keystone: Gift of Life* collaborative has served as a nexus, enabling hospitals and organ procurement specialists to share best practices to increase organ donations in Michigan. As a result of the collaboration between Michigan hospitals, Michigan Gift of Life and the MHA Keystone Center, Michigan's statewide donation rate has climbed to 77 percent of eligible donors, as compared to 61 percent nationally. In addition, sixteen Michigan hospitals have received the Department of Health and Human Services *Medal of Honor* for

achieving and sustaining the national goal of at least a 75 percent donation rate for the past year.

During the past four years, The *Keystone: Intensive Care Unit* — or *ICU* — collaborative has engaged more than 120 ICUs at 72 Michigan hospitals, helping them apply evidence-based best practice to reduce the risk of patients developing infections in the ICU. In this effort, the MHA Keystone Center partnered with patient safety experts from Johns Hopkins University and the results have been nothing short of incredible. Last December, the *New England Journal of Medicine* published an original article about the dramatic reduction in catheter-related bloodstream infections seen in Michigan ICUs. In the past two years, there have been zero bloodstream infections in more than half of the ICUs in Michigan.

Key clinical interventions to prevent ventilator-associated pneumonia have been tremendously successful, with the rate of pneumonia dropping nearly in half. During a 37-month span, between March 2004 and March 2007, hospitals' work to make ICU care safer resulted in an estimated savings of more than 1,700 lives, nearly 128,000 excess hospital days and more than 246 million health care dollars.

In addition to these savings, we have seen dramatic shifts in the culture of the hospital teams engaged in this work. This culture change is absolutely vital to ensure the continued success of the interventions that resulted in the improved clinical outcomes. We measure culture across six domains including safety, teamwork, stress recognition, perceptions of management, job satisfaction and working conditions. In nearly all cases, we have seen dramatic increases in the responses to these domains. Other powerful effects of culture change are evident in the decreased rates of nursing staff

turnover in participating teams. We are hearing from nurses that there is enhanced recognition of their roles – simply stated, they are feeling revitalized about the work they do and the care they give.

The culture change that sustains these improved clinical outcomes is due in part to valid and reliable data showing progress that is then shared with the care teams, reinforcing their efforts. In addition to those that are providing the care, the engagement and support of senior leadership also makes and impact. Our data has shown that the involvement of chief executive officers, chief operating officers and chief nursing officers has a direct and significant effect on improving culture and clinical outcomes.

The ICU teams continue their efforts by addressing the rapid identification and treatment of sepsis, further interventions to reduce the risks of ventilator-associated pneumonia and palliative

care. In all of these interventions, we will continue to apply evidence-based best practice to improve care.

While Michigan doctors and nurses continue their Keystone efforts in the ICU, Michigan hospitals working in collaboration with the MHA Keystone Center are pursuing *additional* areas in which to make care safer. At present, we are addressing the prevalence of hospital-associated infections in a much broader initiative, the *MHA Keystone: Hospital-Associated Infections* initiative. Each year, up to 10 percent of hospital patients develop infections nationally, resulting in avoidable loss of life and billions of dollars in excess cost. For years, infections were considered a fact of life, and that perception is simply no longer acceptable.

In October, 110 Michigan hospitals began working together to reduce the risk of their patients developing infections. The *MHA Keystone: HAI* initiative, working with an expert panel that

includes the U.S. Centers for Disease Control and Prevention, provides hospitals with evidence-based best practice in the prevention of infections. In *MHA Keystone: HAI*, we are not focusing on one specific organism as some suggest; our focus is to eliminate ALL infections.

As with the ICU collaborative, *Keystone: HAI* employs interventions that are evidence-based. These interventions include addressing everything from the simplest habits — assuring that care givers wash their hands before and after patient contact — to preventing urinary tract infections by reducing the utilization of unnecessary catheters. Just as done in the ICU, hospitals are working to change the culture of health care delivery by shifting to the view of preventing harm by preventing infections.

In addition to the actions underway in *MHA Keystone: ICU* and *HAI* – including bloodstream infection, ventilator-associated

pneumonia and urinary tract infection – the MHA Keystone Center is now addressing surgical-site infections and preventable complications. This summer, Michigan hospitals are being invited to participate in this new collaborative, *MHA Keystone: Surgery*. This initiative will include interventions where the surgeon and the surgical team review critical factors before the surgery begins to assure that they minimize the risk of unanticipated events.

These efforts represent a tremendous outlay of staff time and resources by the hospitals. They participate in MHA Keystone because they see the benefits to their patients and their communities. Perhaps most telling is the fact that MHA member hospitals are the source for the new ideas that the MHA Keystone Center can develop and facilitate. Even now, as we launch the *MHA Keystone: Surgery* initiative, plans are underway to develop collaboratives for high-risk obstetrics and emergency department flow and care.

Additionally, as a natural evolution of the work that the MHA has done through its Keystone Center, MHA announced in March of this year that they will be forming a Patient Safety Organization. The idea for a Patient Safety Organization, or P – S – O, is based on the concept that the Federal Aviation Administration has used to successfully prevent airplane crashes. It will utilize a reporting system that is based on receiving and reviewing near misses and adverse clinical events in a protected manner. This system will allow for a free exchange of information and ideas about how to prevent future occurrences. While bipartisan federal legislation opened the door to PSOs in 2005, final regulations on their structure have not been set. Nonetheless, this is an important next step in making care safer and work has begun to create a reporting system for Michigan hospitals.

In all regards, Michigan's nonprofit community hospitals have taken a leadership role in assuring that patients receive safe,

high-quality care and purchasers of health care receive value for their health care dollar. By creating an environment where hospitals, physicians and other care providers can continue to move forward in a voluntary, non-judgmental way, Michigan is well positioned to become a world-class destination for health care.

Thank you for your time and attention on this issue today. I'm happy to entertain any questions that you might have.

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Michigan Hospitals' Patient Safety Organization (PSO)

Origin of the PSO

In 2005, federal law created a mechanism to allow all health care providers to share information about patient safety issues — including adverse events and near misses — to work together to create cultures of safety. The Agency for Healthcare Research and Quality (AHRQ) was charged with developing and publishing regulations stipulating what an organization must do to receive status as a federally certified PSO.

Making Patient Care Safer

The Michigan Health & Hospital Association (MHA) has demonstrated leadership and vision in the field of patient safety through its pioneering efforts in creating the MHA **Keystone Center for Patient Safety & Quality** in 2003. Through the MHA Keystone Center, Michigan hospitals have achieved unprecedented levels of improvement in both clinical outcomes and cultural change and have gained national recognition through the *Keystone: ICU* collaborative. The efforts and success of the MHA Keystone Center have been recognized by ***Crain's Detroit Business*** which awarded the MHA Keystone Center a 2006 *Crain's Health Care Heroes Award* for outstanding advancement in health care for bringing hospitals together for the betterment of ICU patients. The accomplishments of *Keystone: ICU* have also been touted in numerous publications statewide and nationally, including ***Newsweek***. Most recently, an article published in the ***New England Journal of Medicine*** reported the results of the near elimination of bloodstream infections in ICUs participating in the *Keystone: ICU* project.

MHA Keystone Center for Patient Safety & Quality

Moving Forward

The MHA, through its Service Corporation Data Services division has had more than 20 years of experience in hospital data collection. By combining this with MHA Keystone Center's proven ability to effect real change, Michigan hospitals are taking the next natural step in providing a safer environment for the patients they serve. This voluntary effort to report, collect and analyze adverse event data will contribute immensely to the movement to improve patient safety and quality.

MHA MICHIGAN HEALTH & HOSPITAL ASSOCIATION SERVICE CORPORATION

The MHA and its Keystone Center provide a unique structure that brings large numbers of hospitals together in a non-competitive environment to address single-improvement initiatives. The Michigan Hospitals' Patient Safety Organization will further this mission and expound upon the safety and quality achievements made thus far by Michigan hospitals.

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THIS WEEK IN THE JOURNAL

PERSPECTIVE

CLINICAL PRACTICE

An Intervention to Decrease Catheter-Related Bloodstream Infections in the ICU

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ABSTRACT

BACKGROUND

Catheter-related bloodstream infections occurring in the intensive care unit (ICU) are common, costly, and potentially lethal.

METHODS

We conducted a collaborative cohort study predominantly in ICUs in Michigan. An evidence-based intervention was used to reduce the incidence of catheter-related bloodstream infections. Multilevel Poisson regression modeling was used to compare infection rates before, during, and up to 18 months after implementation of the study intervention. Rates of infection per 1000 catheter-days were measured at 3-month intervals, according to the guidelines of the National Nosocomial Infections Surveillance System.

RESULTS

A total of 108 ICUs agreed to participate in the study, and 103 reported data. The analysis included 1981 ICU-months of data and 375,757 catheter-days. The median rate of catheter-related bloodstream infection per 1000 catheter-days decreased from 2.7 infections at baseline to 0 at 3 months after implementation of the study intervention ($P \leq 0.002$), and the mean rate per 1000 catheter-days decreased from 7.7 at baseline to 1.4 at 16 to 18 months of follow-up ($P < 0.002$). The regression model showed a significant decrease in infection rates from baseline, with incidence-rate ratios continuously decreasing from 0.62 (95% confidence interval [CI], 0.47 to 0.81) at 0 to 3 months after implementation of the intervention to 0.34 (95% CI, 0.23 to 0.50) at 16 to 18 months.

CONCLUSIONS

An evidence-based intervention resulted in a large and sustained reduction (up to 66%) in rates of catheter-related bloodstream infection that was maintained throughout the 18-month study period.

From the School of Medicine (P.P., D.N., S.B., S.C., B.S.), the School of Professional Studies in Business and Education (D.S.), and the Bloomberg School of Public Health (H.C.), Johns Hopkins University, Baltimore; and the University of Michigan, Ann Arbor (R.H.); William Beaumont Hospital, Royal Oak (R.W.); Ingham Regional Medical Center, Lansing (G.R.); Harper University Hospital, Detroit (J.B.); Sparrow Health System, Lansing (J.K.); and the Michigan Health and Hospital Association Keystone Center for Patient Safety and Quality, Lansing (C.G.) — all in Michigan.

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CATHETER-RELATED BLOODSTREAM INfections are common, costly, and potentially lethal.[1,2] Each year in the United States, central venous catheters may cause an estimated 80,000 catheter-related bloodstream infections and, as a result, up to 28,000 deaths among patients in intensive care units (ICUs). Given that the average cost of care for a patient with this infection is $45,000,[3] such infections could cost up to $2.3 billion annually. According to the National Nosocomial Infections Surveillance (NNIS) system of the Centers for Disease Control and Prevention (CDC), the median rate of catheter-related bloodstream infection in ICUs of all types ranges from 1.8 to 5.2 per 1000 catheter-days.[3,4] Interventions aimed at decreasing the infection rate are needed to reduce the serious public health consequences of this hospital-acquired infection.

How many of these infections are preventable is unknown. Several single-hospital studies and two multicenter studies have shown reductions in the rates of catheter-related bloodstream infection.[5-12] To build on this research, we studied the extent to which these infections could be reduced in Michigan, using an intervention as part of a statewide safety initiative regarding patients in ICUs, known as the Michigan Health and Hospital Association (MHA) Keystone Center for Patient Safety and Quality Keystone ICU project, which was funded predominantly by the Agency for Healthcare Research and Quality (AHRQ). The objective of the study was to evaluate the effect of the intervention up to 18 months after its implementation.

METHODS

THE INTERVENTION

All Michigan hospitals with ICUs for adults were invited to participate in the Keystone ICU project, launched in October 2003. Hospitals were not asked to provide reasons for not participating. Five out-of-state hospitals of a health system with its corporate headquarters in Michigan participated at the request of the senior executive of the health system. Between March 2004 and September 2005, each ICU implemented several patient-safety interventions, according to a prospective cohort study design, and monitored the effect of these interventions on specific safety measures.

In addition to the intervention to reduce the rate of catheter-related bloodstream infection, the ICUs implemented the use of a daily goals sheet to improve clinician-to-clinician communication within the ICU,[13] an intervention to reduce the incidence of ventilator-associated pneumonia,[14] and a comprehensive unit-based safety program to improve the safety culture.[15,16] The period necessary for implementation of each intervention was estimated to be 3 months. Hospitals started with implementation of the unit-based safety program and use of the daily goals sheet and then, in any order, implemented the other two interventions during the subsequent 6 months.

Before implementing any of the components of the study intervention, the ICUs were asked to designate at least one physician and one nurse as team leaders.[17] The team leaders were instructed in the science of safety and in the interventions and then disseminated this information among their colleagues. Training of the team leaders was accomplished through conference calls every other week, coaching by research staff, and statewide meetings twice a year. The teams received supporting information on the efficacy of each component of the intervention, suggestions for implementing it, and instruction in methods of data collection (described in detail in Appendix A of the Supplementary Appendix, available with the full text of this article at www.nejm.org). Team leaders were partnered with their local hospital-based infection-control practitioners to assist in the implementation of the intervention and to obtain data on catheter-related bloodstream infections at the hospital.

The study intervention targeted clinicians' use of five evidence-based procedures recommended by the CDC and identified as having the greatest effect on the rate of catheter-related bloodstream infection and the lowest barriers to implementation.[1] The recommended procedures are hand washing, using full-barrier precautions during the insertion of central venous catheters, cleaning the skin with chlorhexidine, avoiding the femoral site if possible, and removing unnecessary catheters.

Strategies to increase the use of these procedures have been described elsewhere.[10] Briefly, clinicians were educated about practices to control infection and harm resulting from catheter-related bloodstream infections, a central-line cart with necessary supplies was created, a checklist was used to ensure adherence to infection-control practices, providers were stopped (in nonemergency situations) if these practices were not be-

ing followed, the removal of catheters was discussed at daily rounds, and the teams received feedback regarding the number and rates of catheter-related bloodstream infection at monthly and quarterly meetings, respectively. In April 2004, a letter and a baseline survey were sent to the chief executive officers (CEOs) of the participating hospitals. The letter outlined the evidence supporting the use of chlorhexidine[1] and asked the CEOs to stock chlorhexidine in their hospitals before implementing the study intervention.

MEASUREMENT AND CATEGORIZATION OF DATA

Throughout the study, data on the number of catheter-related bloodstream infections and catheter-days were collected monthly from a trained, hospital-based infection-control practitioner. Hospitals were given the NNIS definition of catheter-related bloodstream infection (Fig. 1). Study investigators asked members of the teams to adhere to the NNIS definition of catheter-related bloodstream infection during the study period. Three ICUs changed the definition used from their own to that of the NNIS. Infection-control staff at the hospitals adjudicated contaminated cultures before submitting data for the study. We defined a central catheter as a catheter that ends at or near the heart or in a great vessel close to the heart, and the teams were explicitly instructed to exclude peripherally inserted central catheters and to count the use of multiple lines in one patient as 1 catheter-day, in accordance with the NNIS guidelines. To simplify data collection, the average duration of catheter use in individual patients was not monitored.

To coincide with the implementation periods for the study intervention, monthly data were aggregated into 3-month periods (quarters). The quarterly rate of infection was calculated as the number of infections per 1000 catheter-days for each 3-month period. Quarterly rates were assigned to one of eight categories on the basis of when the study intervention was implemented: at baseline, during the implementation period, or during one of six 3-month intervals occurring up to 18 months after implementation. We did not collect data on who inserted the central catheters. To our knowledge, no other infection-reducing practices were implemented during our study.

EXPOSURE, OUTCOMES, AND STUDY HYPOTHESES

We modeled exposure to the study intervention, after full implemention, according to six categorical temporal variables, comparing values for those variables with baseline values. The outcome was the quarterly rate of catheter-related bloodstream infection. The analysis included three characteristics of the hospitals, obtained from the American Hospital Association database: teaching status (a binary variable), bed size (a continuous variable), and geographic region (eight categories). Teaching hospitals were required to be members of the Council of Teaching Hospitals Health Systems and to have been approved for residency training by the Accreditation Council for Graduate Medical Education or the American Osteopathic Association. The primary study hypothesis was that the rate of catheter-related bloodstream infection would be reduced during the first 3 months after implementation of the study intervention as compared with baseline. A secondary hypothesis was that the observed decrease in the rate of infection between 0 and 3 months after implementation of the study intervention would be sustained during the subsequent observation period. We did not evaluate the relative effectiveness of the separate components of the intervention.

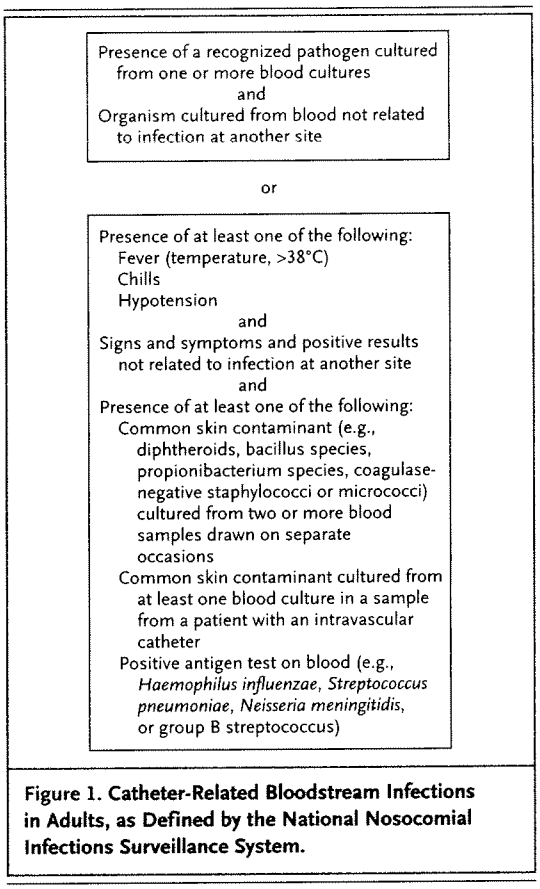

Figure 1. Catheter-Related Bloodstream Infections in Adults, as Defined by the National Nosocomial Infections Surveillance System.

STATISTICAL ANALYSIS

Because of the nonnormal distribution of the data on catheter-related bloodstream infections, medians and interquartile ranges were used to summarize the data. Medians were compared with baseline values with the use of a two-sample Wilcoxon rank-sum test. To explore the exposure–outcome relationship, we used a generalized linear latent and mixed model[18,19] with a Poisson distribution for the quarterly number of catheter-related bloodstream infections. In the model, we used robust variance estimation and included two-level random effects to account for nested clustering within the data, catheter-related bloodstream infections within hospitals, and hospitals within the geographic regions included in the study.[18,20] The addition of a third level of clustering for a potential ICU effect (catheter-related bloodstream infections within ICUs, ICUs within hospitals, and hospitals within the geographic regions) did not change the results. We adjusted for the hospital's teaching status and bed size in the model and explored interactions between the effect of the study intervention (modeled as a continuous variable) and teaching status and bed size. We conducted a sensitivity analysis of these results in which only ICUs with continuous data, including baseline (preimplementation) data, were included. All reported P values are two-sided; a P value of 0.05 or less was considered to indicate statistical significance. We used Stata software (version 9.1) for the analysis. The study was approved by the institutional review board of Johns Hopkins University School of Medicine. Informed consent was waived because the study was considered exempt from review.

The AHRQ provided financial support for the Keystone ICU project but had no role in the design or conduct of the study; the collection, management, analysis, or interpretation of the data; the preparation, review, or approval of the manuscript; or the decision to submit the manuscript for publication. The MHA provided support for the biannual statewide meetings but had no influence on the design, implementation, analysis, or results of the study. The authors had full access to the data and vouch for the accuracy and completeness of the data and the analysis.

RESULTS

Five of 108 participating ICUs were excluded: 4 because they did not track or report catheter-related bloodstream infections, catheter-days, or both, and 1 because it merged with another participating ICU, so that the combined data were used in the analysis. The data were obtained from 67 hospitals, of which 52% were teaching facilities. The types of ICU included medical, surgical, cardiac medical or surgical, neurologic, and surgical trauma units and one pediatric unit. The ICUs represented 1625 (85%) of all ICU beds in Michigan. Of 34 hospitals in Michigan that did not participate in the study, 27 (79%) had fewer than 100 beds; the total number of beds in the ICUs not included in the study was 268.

Thus, 103 ICUs reporting data for 1981 ICU-months and 375,757 catheter-days were included in the final analysis. The characteristics of the ICUs according to the study period are summarized in Table 1. Baseline data on catheter-related bloodstream infections at the participating ICUs

Table 1. Characteristics of 103 Participating ICUs, According to the Period of Implementation of the Intervention to Reduce the Rate of Catheter-Related Bloodstream Infections.

Period	No. of ICUs	No. of Catheter-Days per Month	Teaching Hospital	No. of Beds
		median (interquartile range)	%	*median (interquartile range)*
March to May 2004*	40	154 (94–258)	83	404 (268–609)
June to August 2004	35	146 (72–228)	57	336 (218–610)
September to November 2004	17	181 (80–275)	59	299 (190–393)
After November 2004	11	172 (48–279)	73	288 (181–917)

* Baseline data were not collected by ICUs implementing the study intervention during the baseline (preimplementation) period.

are summarized in Table 2, according to the teaching status and bed size of the hospitals. When the Keystone ICU project was launched, 13 of the 67 hospitals (19%) included chlorhexidine in the central-line kits used in the ICUs. Six weeks after the study letter was sent to CEOs at the 67 participating hospitals, 56 (84%) stocked chlorhexidine, 46 (69%) stocked the agent in the ICU, and 43 (64%) stocked it in central-line carts.

The total number of catheter-days changed little during the study. In ICUs that implemented the study intervention during the 3 months (June to August 2004) after baseline data were collected (Table 1), the mean number of catheter-days per month was 4779. During the follow-up period, the mean number of catheter-days per month ranged from 4757 at 4 to 6 months after implementation of the intervention to 5469 at 10 to 12 months after implementation.

The overall median rate of catheter-related bloodstream infection decreased from 2.7 (mean, 7.7) infections per 1000 catheter-days at baseline to 0 (mean, 2.3) at 0 to 3 months after implementation of the study intervention ($P \leq 0.002$) and was sustained at 0 (mean, 1.4) during 18 months of follow-up (Table 3). A significant decrease was observed in both teaching and nonteaching hospitals and in small hospitals (<200 beds) and large hospitals (≥200 beds) (Table 3).

The multilevel Poisson regression model showed a significant decrease in rates of catheter-related bloodstream infection during all study periods as compared with baseline rates, with incidence-rate ratios continuously decreasing from 0.62 (95% confidence interval [CI], 0.47 to 0.81) at 0 to 3 months to 0.34 (95% CI, 0.23 to 0.50) at 16 to 18 months after implementation of the study intervention (Table 4). There was a significant interaction between the intervention and bed size: the intervention was modestly more effective in small hospitals, with an incidence-rate ratio of 0.97 (95% CI, 0.96 to 0.99; $P<0.001$) for each 100-bed decrease in the size of the hospital. The results of a sensitivity analysis of data from the 53 ICUs reporting data continuously from baseline onward were similar to those of the primary analysis, with incidence-rate ratios decreasing from 0.62 (95% CI, 0.46 to 0.85) at 0 to 3 months to 0.15 (95% CI, 0.07 to 0.32) at 16 to 18 months of follow-up.

DISCUSSION

The goal of the MHA Keystone ICU project was to improve patient safety in ICUs in Michigan. The analysis was focused on an intervention to reduce the rate of catheter-related bloodstream infection that was implemented in 103 ICUs in Michigan in 2004. Within 3 months after implementation, the median rate of infection was 0, a rate sustained throughout the remaining 15 months of follow-up. All types of participating hospitals realized a similar improvement.

Table 2. Baseline Data.

Characteristic	No. of ICUs	Baseline Period		
		No. of Infections	Catheter-Days	No. of Infections per 1000 Catheter-Days
		median (interquartile range)		
All hospitals	55*	2 (1–3)	511 (220–1091)	2.7 (0.6–4.8)
Teaching status				
Teaching	33	2 (1–4)	744 (377–1134)	2.7 (1.3–4.7)
Nonteaching	22	1 (0–2)	306 (194–608)	2.6 (0–4.9)
No. of beds				
<200	13	1 (0–1)	247 (75–377)	2.1 (0–3.0)
200–299	12	2 (1–6)	595 (338–1670)	3.2 (0.3–4.3)
300–399	12	2 (1–3)	902 (184–1376)	2.7 (1.7–5.8)
≥400	18	2 (1–3)	616 (424–1102)	2.0 (1.3–4.7)

* Of the 103 participating ICUs, 48 did not contribute baseline data — 40 because they implemented the intervention at the initiation of the study and 8 because they did not report baseline data.

Table 3. Rates of Catheter-Related Bloodstream Infection from Baseline (before Implementation of the Study Intervention) to 18 Months of Follow-up.*

Study Period	No. of ICUs	No. of Bloodstream Infections per 1000 Catheter-Days				
		Overall	Teaching Hospital	Nonteaching Hospital	<200 Beds	≥200 Beds
		median (interquartile range)				
Baseline	55	2.7 (0.6–4.8)	2.7 (1.3–4.7)	2.6 (0–4.9)	2.1 (0–3.0)	2.7 (1.3–4.8)
During implementation	96	1.6 (0–4.4)†	1.7 (0–4.5)	0 (0–3.5)	0 (0–5.8)	1.7 (0–4.3)†
After implementation						
0–3 mo	96	0 (0–3.0)‡	1.3 (0–3.1)†	0 (0–1.6)†	0 (0–2.7)	1.1 (0–3.1)‡
4–6 mo	96	0 (0–2.7)‡	1.1 (0–3.6)†	0 (0–0)‡	0 (0–0)†	0 (0–3.2)‡
7–9 mo	95	0 (0–2.1)‡	0.8 (0–2.4)‡	0 (0–0)‡	0 (0–0)†	0 (0–2.2)‡
10–12 mo	90	0 (0–1.9)‡	0 (0–2.3)‡	0 (0–1.5)‡	0 (0–0)†	0.2 (0–2.3)‡
13–15 mo	85	0 (0–1.6)‡	0 (0–2.2)‡	0 (0–0)‡	0 (0–0)†	0 (0–2.0)‡
16–18 mo	70	0 (0–2.4)‡	0 (0–2.7)‡	0 (0–1.2)†	0 (0–0)†	0 (0–2.6)‡

* Because the ICUs implemented the study intervention at different times, the total number of ICUs contributing data for each period varies. Of the 103 participating ICUs, 48 did not contribute baseline data. P values were calculated by the two-sample Wilcoxon rank-sum test.
† $P \leq 0.05$ for the comparison with the baseline (preimplementation) period.
‡ $P \leq 0.002$ for the comparison with the baseline (preimplementation) period.

This study showed that a large-scale project focused on reducing the incidence of catheter-related bloodstream infection is feasible and can have important public health consequences. Current efforts to improve patient safety in the United States are fragmented, with few large-scale improvements documented.[21-23] The ability to measure and evaluate the effect of interventions to increase patient safety is still underdeveloped.[21,24] In this project, monitoring catheter-related bloodstream infection rates was possible because of the existence of an infrastructure — specifically, congressional funding to develop and maintain the NNIS and a staff of hospital-based infection-control practitioners. Similar infrastructure does not exist for most other issues related to patient safety.

Important reductions in morbidity and health care costs could be achieved if the intervention to reduce catheter-related bloodstream infections could be introduced successfully nationwide or worldwide. Given the results of the study, many of the estimated 80,000 infections, up to 28,000 deaths, and $2.3 billion in costs attributed to these infections annually in the United States could be reduced. The intervention was implemented without the use of expensive technology or additional ICU staffing. However, the MHA and AHRQ funded this intervention, and the participating hospitals provided staff to implement it. The estimated costs associated with catheter-related bloodstream infections vary, ranging from $11,971 to $54,000 per infection.[3,25] Given that the participating ICUs had reported 695 catheter-related bloodstream infections annually before the study, implementing the study intervention offers a strategy to improve clinical outcomes and reduce costs.

The study has several limitations. First, the design reduces the ability to make a causal connection between the intervention and reduced rates of catheter-related bloodstream infection. Randomized assignment of the intervention and of the time of implementation was not feasible, because all the ICU teams wanted to implement the intervention and to decide for themselves when to do so. However, several factors support a true and strong association between the intervention and a reduction in rates of catheter-related bloodstream infection: variability in the timing of implementation reduced any effect of seasonal trend on the baseline rates of infection, reduced infection rates were sustained and fell further with continued exposure to the intervention, and similar large decreases in infection rates were not observed outside Michigan during the study period.

Second, potential underreporting of catheter-related bloodstream infections and the lack of

baseline data from ICUs that immediately implemented the intervention when the project was launched could have created a measurement bias that exaggerated the results. However, the infection rates were collected and reported according to the guidelines of the NNIS by hospital infection-control practitioners who were independent of the ICU staff implementing the intervention. Furthermore, a sensitivity analysis showed little change in the association between the intervention and outcomes when only ICUs for which complete data (including baseline data) were available were included.

Third, data on the organisms causing catheter-related bloodstream infections were not collected, limiting insight into the mechanism of the observed benefit. Fourth, we did not evaluate compliance with the study intervention, because limited resources prevented observation of central-line placements. Fifth, we could not evaluate the relative importance of individual components of the multifaceted intervention or of the safety-culture intervention. However, our goal was maximal improvement of patient safety, and the study program offered the greatest probability of reducing catheter-related bloodstream infections. Sixth, we did not obtain data on catheter-related bloodstream infection rates from nonparticipating ICUs. Nevertheless, the ICUs that participated in the study accounted for 85% of ICU beds in Michigan. Last, we studied ICUs in only one state, which may limit the ability to generalize our findings. Nevertheless, a wide variety of types of hospital and ICU were studied.

In summary, catheter-related bloodstream infections are expensive, prevalent, and often fatal. As part of the Michigan statewide patient-safety initiative, we implemented a simple and inexpensive intervention to reduce these infections in 103 ICUs. Coincident with the intervention, the median rate of infection decreased from 2.7 per 1000 catheter-days at baseline to 0 within the first 3 months after the implementation of the intervention. The benefit from the intervention was sustained, and there was a reduction in the rate of catheter-related bloodstream infection of 66% at 16 to 18 months after implementation. Broad use of this intervention could significantly reduce morbidity and the costs of care associated with catheter-related bloodstream infections.

Table 4. Incidence-Rate Ratios for Catheter-Related Bloodstream Infections.*

Variable	Incidence-Rate Ratio (95% CI)	P Value
Study period		
Baseline	1.00	
During implementation	0.76 (0.57–1.01)	0.063
After implementation		
0–3 mo	0.62 (0.47–0.81)	0.001
4–6 mo	0.56 (0.38–0.84)	0.005
7–9 mo	0.47 (0.34–0.65)	<0.001
10–12 mo	0.42 (0.28–0.63)	<0.001
13–15 mo	0.37 (0.20–0.68)	0.001
16–18 mo	0.34 (0.23–0.50)	<0.001
Teaching hospital	1.34 (0.73–2.46)	0.35
Bed size (per 100 beds)	1.03 (0.97–1.09)	0.33

* Incidence-rate ratios were calculated with the use of a generalized linear latent and mixed model (Rabe-Hesketh and Skrondal[18]), with robust variance estimation and random effects to account for clustering of catheter-related bloodstream infections within hospitals and clustering of hospitals within geographic regions. Rates of catheter-related bloodstream infection during and after implementation of the study intervention were compared with baseline (preimplementation) values, adjusted for the hospital's teaching status and number of beds.

Supported by a grant from the AHRQ (1UC1HS14246) for the Keystone ICU project.

Dr. Pronovost reports receiving consulting fees from CriticalMed and DocuSys and holding equity ownership in DocuSys and Visicu; Dr. Berenholtz, receiving consulting fees from VHA; Dr. Cosgrove, receiving grant support from Merck, receiving consulting fees from Cubist Pharmaceuticals, and being a member of an advisory board for Ortho-McNeil; Dr. Hyzy, receiving lecture fees from Eli Lilly and Wyeth; and Dr. Bander, receiving consulting fees and lecture fees from Eli Lilly, Elan Pharmaceuticals, and the Surviving Sepsis Campaign. No other potential conflict of interest relevant to this article was reported.

We thank C.G. Holzmueller for assistance in editing; P. Lipsett and T. Perl for thoughtful review of a draft of the manuscript; and the MHA Keystone Center and all the ICU teams in Michigan for their tremendous efforts, leadership, and courage and their dedication to improving the quality of the care and safety of their patients. (For a list of the participating hospitals, see Appendix B in the Supplementary Appendix.)

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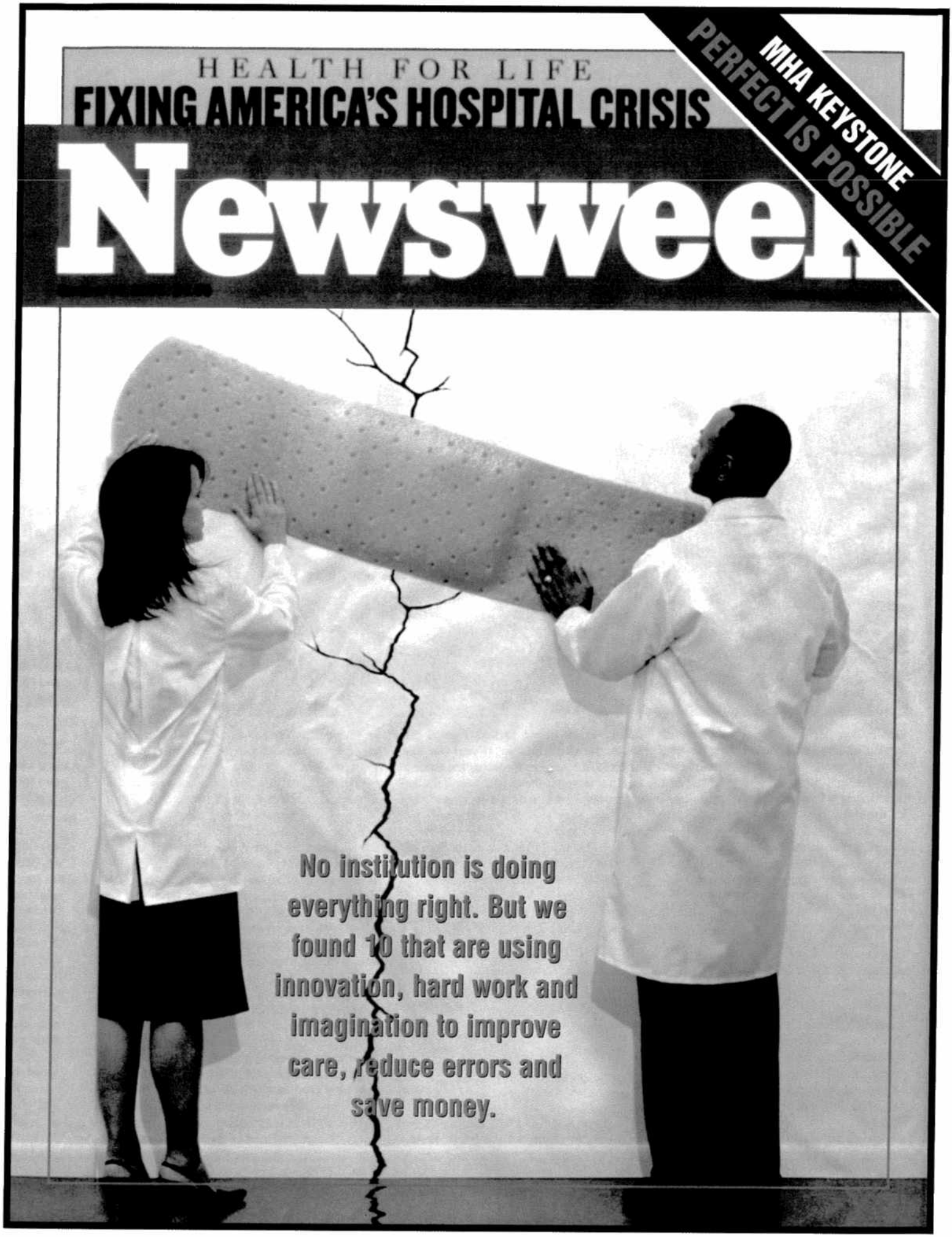


Perfect Is Possible

Pilot projects at hundreds of hospitals around the country prove that medical error rates can be reduced to zero.

BY DONALD M. BERWICK, M.D., AND LUCIAN L. LEAPE, M.D.

WHEN DEFECTS ARE COMMON, THEY CAN feel normal—inevitable. Instead of trying to fix them, people accept them. For a lot that is wrong with health care today, that is exactly the situation—even though the Institute of Medicine reports that as many as 100,000 people die each year in hospitals from avoidable errors. These errors aren't invisible. Many nurses, doctors, patients and families are all too familiar with what went wrong in care despite the best efforts of the clinicians. But if completely preventing errors seems a hopeless task, why even try?

Recent experience—at first from just a handful of hospitals, but now from hundreds—shows that this pessimism is unfounded. Many kinds of errors can be completely eliminated; "zero defects" is possible. Some hospitals are, for example, achieving once impossible success at eliminating certain kinds of infections and medication errors. There is no reason these successes can't be widely replicated, maybe everywhere.

In 2000, the Robert Wood Johnson Foundation, in cooperation with the Institute for Healthcare Improvement (IHI), challenged hospitals to apply for grants to help them "pursue perfection" in their safety, reliability, patient focus, waiting times and efficiency. More than 200 hospitals applied; seven were chosen as grantees in what became the Pursuing Perfection Project. After five years, each was still far from "perfect," but their achievements clearly raised the bar for all U.S. hospitals.

Two of the grantees—Hackensack University Hospital in New Jersey and McLeod Regional Medical Center in Florence, S.C.—used strict protocols and guidelines and automated systems to ensure that nearly 100 percent of all heart-attack patients received needed medications, driving heart-attack death rates down below 5 percent, compared with the U.S. average for Medicare patients of 10 percent. Cincinnati Children's Hospital Medical Center revolutionized its approach to children with cystic fibrosis and diabetes by giving patients and families much more power to make decisions about their own care, such as adjusting their own medications or creating their own schedules for therapy visits and treatments in the hospital. Complications dropped by 30 to 50 percent.

In Whatcom County, Wash., St. Joseph Hospital used "nurse navigator" coaches (to help coordinate information and plans among physicians and institutions) and a patient-controlled personal health record called the Shared Care Plan for chronically ill patients that defined specific goals and plans that every doctor and nurse involved would abide by. These measures reduced expenses for emergency visits and hospital admissions by an average of $3,000 per patient per year by keeping patients healthy at home. HealthPartners, an integrated-care system in Minneapolis, cut readmission rates for congestive-heart-failure patients in half by making absolutely sure that medications were correctly prescribed and fully understood by patients every time.

Encouraged by the success of the Pursuing Perfection Project and published scientific studies, the IHI launched the 100,000 Lives Campaign in December 2004 to enlist at least 2,000 U.S. hospitals in an effort to prevent needless in-patient deaths by implementing six proven patient-safety practices that could save an estimated 100,000 lives over 18 months.

What were the practices? Nurses and other hospital workers could call Rapid Response Teams on an emergency basis when they become worried about a patient, instead of waiting for the

ZERO TOLERANCE: **Berwick (left) and Leape**

PHOTOGRAPHS BY GUIDO VITTI FOR NEWSWEEK

patient to have a cardiac arrest. Medication Reconciliation processes reduced the chance of errors in medication when patients entered the hospital, were moved from one part of the hospital to another, or when they were discharged. Highly reliable heart-attack treatments (similar to those at McLeod and Hackensack) were put in place. Procedures to reduce the risk of three types of serious, sometimes fatal, infections were implemented. These included bloodstream infections from plastic intravenous catheters, surgical-wound infections and pneumonias associated with mechanical ventilators.

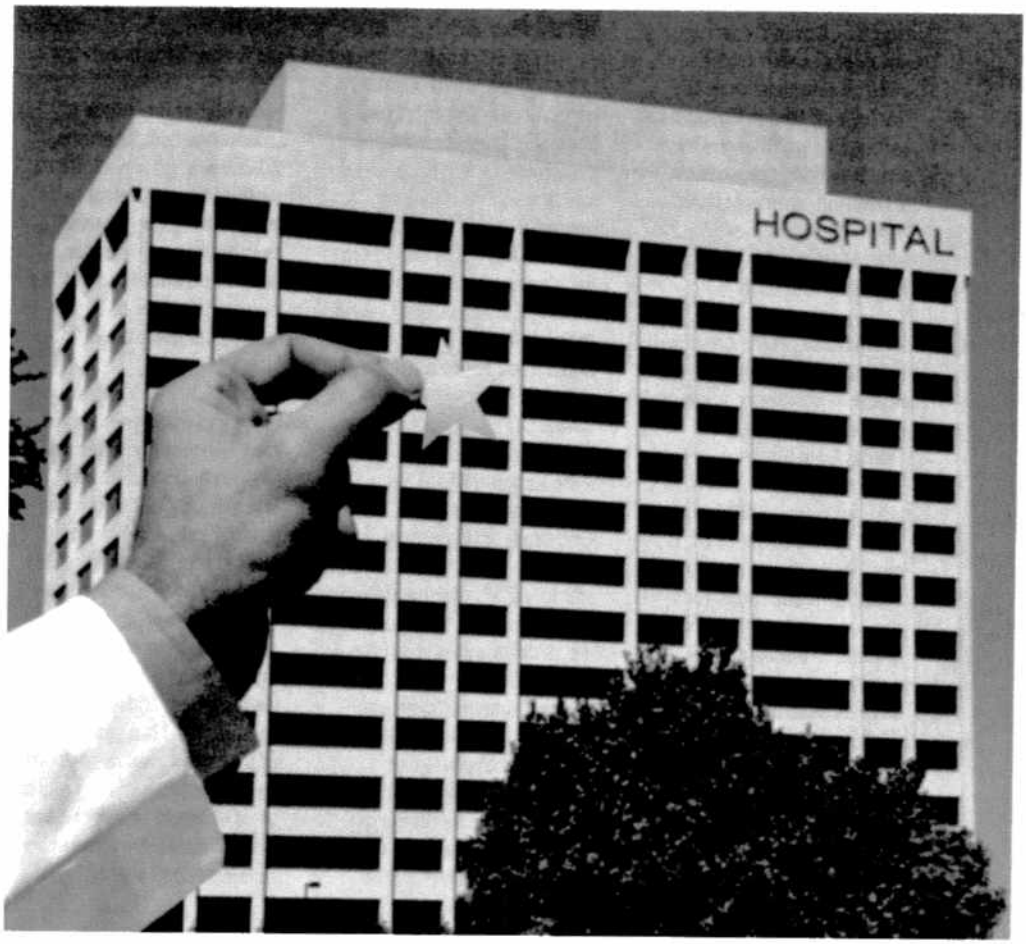
One big idea in the 100,000 Lives Campaign was the "all-or-none" scoring of reliability. For example, a hospital either did everything right for a patient on a ventilator machine, or it scored a "zero." No partial credit.

The results of the 100,000 Lives Campaign, announced in June 2006, were astounding. More than 3,100 hospitals enrolled—accounting for almost 80 percent of all hospital admissions in the United States. Most introduced more than one of the six changes, and 39 percent instituted all six. Using data submitted by the hospitals, the IHI estimated that approximately 122,000 fewer patients died during the 18-month period of the campaign than would have been expected (IHI emphasizes that it's not possible to attribute this change to the campaign alone, since many efforts to improve care are now ongoing in the United States). Twenty-four hospitals have gone for a year—and some for two years—without a single case of ventilator-associated pneumonia in their intensive-care units, and 12 hospitals have gone for a year with no cases of central intravenous line infections. The IHI will relaunch the campaign in December, with a new set of changes and goals.

Another major hospital-safety effort is the Keystone Project, which is run by the Michigan Hospital Association (MHA) and Dr. Peter Pronovost, an intensive-care specialist at Johns Hopkins University. Under Keystone, 127 intensive-care units in Michigan and five in other states have also dramatically raised the standard of safety. Sixty-eight ICUs totally eliminated blood infections associated with central intravenous catheters. For six consecutive months, they abolished pneumonia in patients on ventilators. Compared with the preceding year, the Keystone team estimates that more than 1,578 lives were saved, reducing hospital days by 81,000 and saving $165 million. Hospitals in Rhode Island, New Jersey and Maryland have taken up the challenge and are replicating the Keystone Project locally. Others will follow.

These projects are raising the bar for everyone. According to the Centers of Disease Control and Prevention, 2 million Americans get hospital infections each year. They do not need to. Rates in Norway and Sweden are nearly zero. Why should we accept as inevitable that patients have to die or suffer from hospital-acquired infections, wrong-site surgery, unreliable heart-attack treatment, medication errors—and myriad other forms of error and unreliability in care—when we can now name hospitals that have eliminated or drastically decreased each of these forms of harm? These hospitals have taken away the excuses. Every hospital—every board, executive and clinician—now has to ask, "If they can, why can't we?"

The old "benchmarks"—80 or 90 percent success at implementing guidelines and protocols—are no longer acceptable. No one would tolerate cars that started 90 percent of the time, or tax accountants that got 90 percent of the Form 1040 lines right. We consumers demand a whole different level of excellence in those cases. It's time to expect the same of health care.



Berwick and Leape are members of the Harvard faculty. Berwick is CEO of the Institute for Healthcare Improvement (IHI), and Leape is Adjunct Professor of Health Policy at the Harvard School of Public Health. For health information from Harvard, go to health.harvard.edu.

Two million Americans get hospital infections each year. They do not have to. Why should we accept patient suffering as inevitable?

PHOTO ILLUSTRATION BY FREDRIK BRODEN FOR NEWSWEEK

The Michigan Health & Hospital Association's (MHA) Keystone Center for Patient Safety & Quality was created in March 2003 as a 501(c)(3) division of the MHA Health Foundation. **MHA Keystone brings together hospitals, national experts and best practice evidence to improve patient safety** by addressing the quality of health care delivery at the bedside. One of Keystone's most ambitious collaboratives, *Keystone: ICU*, exists through an ongoing and innovative partnership with patient safety experts. This reprinted article provides a glimpse of the important work and national recognition directed toward this Michigan-based program. For more information, please visit http://www.mha.org/mha/keystone/

CRAIN'S DETROIT BUSINESS

Focus

HEALTH CARE HEROES

Largest group health care providers. Ranked by 2005 revenue
1. Blue Cross Blue Shield of Michigan, $4.2 billion.
2. Health Alliance Plan, $1.6 billion.
3. PharmaCare Management, $544 million.
4. M-Care, $535.7 million.
5. Delta Dental of Michigan, $350 million.
See Page 25 for the complete list.

Back to basics

Mary Ellen Howard, St. Francis Cabrini
Michael Trese, Beaumont Hospitals
Sam Watson, MHA
Ken Kovan, Metrolyne
MICHIGAN HEALTH & HOSPITAL ASSOCIATION

Honorees make improvements by paying attention to the little things

Health care cannot advance without cutting-edge research and treatments, but going back to basics can also save lives and money. In this section, Crain's honors local individuals and organizations for boosting quality of care and access to it — often through simple, common-sense approaches.

One has reduced infections in intensive-care units through such low-tech efforts as requiring hand washing.

One rolled out a wellness program that mixes fun and competition with seminars and screenings.

One is helping to reduce the number of infants affected by eye disease by forming a nonprofit that helps direct dollars toward federally neglected research.

One runs a clinic that offers free care for many of Detroit's uninsured — on an annual budget of only $300,000.

Profiles begin on Page 12

Judges for the contest were:

- Rob Casalou, president, St. John Providence Park Hospital.
- Vernice Davis Anthony, president and CEO, Greater Detroit Area Health Council.
- John Flack, professor of medicine and physiology, interim chair and chief, Division of Translational Research and Clinical Epidemiology, Department of Medicine, Wayne State University, and Specialist in Chief for Internal Medicine, Detroit Medical Center.
- John Harris, global business-development manager, Delphi Medical Systems.

CELEBRATE HEALTH CARE HEROES SEPT. 20

Join us as we celebrate the Health Care Heroes honorees in this section. The Sept. 20 luncheon is from 11:30 a.m. to 1:30 p.m. at the MSU Management Education Center in Troy. It will feature a panel discussion with the winners called "Connections to Care." Sponsors include Crain's Detroit Business and Fifth Third Bank. Tickets are $35. To register online, visit www.crainsdetroit.com or call (313) 446-6043.

OUTSTANDING ADVANCEMENT IN HEALTH CARE

Michigan Health & Hospital Association's Keystone Center for Patient Safety and Quality

Spencer Johnson, MHA president, and Sam Watson, Keystone executive director

"(Participating hospitals) left their egos at the door."

Sam Watson, Keystone Center

The Michigan Health & Hospital Association's statewide push to stamp out hospital-acquired infections in intensive-care units used such low-tech practices as hand washing to reap results.

The big advancement, Crain's four judges said, was in creating a program that could act as a rallying point for 122 competing ICUs.

stone participant, was "thrilled" to share practices that improved patient safety and helped the bottom line, said Tammy [illegible], DMC senior vice president, chief quality and safety officer. Health care associ-

The Detroit News

Metro Edition

detnews.com

Friday, October 14, 2005

Back-to-basics plan saves lives in ICUs

Hospital

Continued from Page 1A

cause of death. The news pushed physicians and the government to focus on improving safety.

Few of the steps the researchers recommended are complicated. To keep intravenous lines from causing infections, they urged doctors to wash hands and asked

not had any cases of bloodstream infections or ventilator-associated pneumonia in at least six months.

"Out of anywhere in the country, if I had to be in an intensive care unit, I'd rather be in an ICU in Michigan than in any other state in the country," said Spencer Johnson, president of the state hospital association.

Pronovost said the researchers' recommendations were based on widely accepted medical evidence, and that they didn't stray into areas

Detroit Free Press

BUSINESS

Friday, Oct. 14, 2005

Michigan wins battle against hospital bugs

Simple ICU changes save patients' lives

ASSOCIATED PRESS

DEARBORN — Complications in Michigan hospitals' intensive care units dropped with the use of simple actions, such as reminding doctors to wash their hands, according to the results of a project to cut medical errors.

The project, which began in 2003, included interventions such as nurses reminding doctors to wash hands, using caps and gowns when inserting IV lines, and using a different disinfectant.

Of the 127 ICUs in 77 Michigan hospitals, 68 had no infections or ventilator-associated pneumonias for at least six months. Overall, infections to patients with central IVs, which deliver drugs to a patient's main artery, fell by 80 percent, and the pneumonia rate fell by 45 percent.

"What we have shown here is the vast majority of those cases are preventable," said Dr. Peter Pronovost of Johns Hopkins University, one of the project leaders.

Researchers estimate the changes prevented 1,500 deaths and saved nearly $166 million in health care costs.

The federal Agency for Health Care Research and Quality paid $1 million for the project, conducted by John Hopkins and the Michigan Health & Hospital Association Keystone Center for Patient Safety & Quality.

ABOVE: Michelle Scigliel, a registered nurse at Oakwood Hospital in Dearborn, cleans the mouth of an intensive care patient Thursday. TOP: Scigliel rinses her hands. She cleans the patient's mouth several times a shift. The hospital has seen a big reduction in infections.

Infections are down nearly 80% in intensive care units thanks to st

By PATRICIA ANSTETT
FREE PRESS MEDICAL WRITER

LSJ .com

Published October 15, 2005

Simple ICU changes save patients' lives

Associated Press

DEARBORN - Complications in M[illegible] single actions, such as reminding

AHANewsNow

American Hospital Association

The Daily Report for Health Care Executives

Friday, October 14, 2005

Michigan project improves patient safety in hospital ICUs

The Michigan Health & Hospital Association and Johns Hopkins University yesterday announced results from a two-year collaboration with the hospital association's Keystone for Patient Safety & Quality to improve patient safety in hospital intensive care units. s researchers estimate that the work of the hospitals involved in the project resulted in an 1,500 fewer inpatient deaths and over $165 million in savings. More than 120 d 70 hospitals are participating in the collaborative, most in Michigan and the rest in a, Iowa and Indiana. The Keystone Center, launched in March 2003, also is working e stroke care and boost the number of organ donations made in Michigan hospitals, er projects.

Two-year study shows BHCS as a leader in hospital safety

BATTLE CREEK — Michigan hospital intensive care units (ICUs) are safer today following a two-year project to reduce med-

■ Health care dollars saved: $165,534,736. These impact estimates are based on projections from the Johns Hopkins Opportunity

MHA Keystone Center for Patient Safety & Quality

Expediting implementation of evidence-based best practice to the bedside

Center Overview

Pioneers in Patient Safety

The Michigan Health & Hospital Association's (MHA) Keystone Center for Patient Safety & Quality was created in March 2003 to address patient safety and the quality of health care delivery. In the years since, Michigan hospitals have demonstrated that an improved culture of safety and communication — coupled with the application of **evidence-based best practices** — can produce significant, meaningful and measurable results: improving health care and saving lives.

MHA Keystone Center is a 501(c)(3) organization and has been funded, to date, by MHA-member hospitals, modest federal grants and Blue Cross Blue Shield of Michigan. The MHA Keystone Center continues to improve patient safety and quality, and enhance the value of health care delivery through the application of science and implementation of evidence-based best practice to save lives and reduce costs.

Vision: Michigan hospitals will lead the nation in patient safety and quality improvement practices.

Mission: The MHA Keystone Center for Patient Safety & Quality will expedite the translation of patient safety and quality evidence into practice.

Strategies: Create will • Build relationships • Partner with experts • Use our voice • Be courageous

Best practice is the concept that there are processes more effective in achieving a particular outcome than any other technique, and with proper processes, checks and testing, care can be given with **fewer problems and unforeseen complications.** ***Evidence-based*** is a term used to indicate that scientific methods have been used to evaluate a process time and time again to ensure the **best prediction of outcomes in medical treatment.**

Unique Approach to Saving Lives, Reducing Costs

MHA Keystone Center is uniquely positioned to bring large numbers of hospitals together in a single improvement initiative while providing a non-competitive environment. Michigan hospitals are then able to collaborate freely. The results of their voluntary efforts have challenged tradition, raising the bar for health care quality and showing hospitals that "perfect is possible."

MHA Keystone Center uses the **Johns Hopkins University** collaborative model for transformational change in all its work. The model is based on four "E"s: Engage, Educate, Execute and Evaluate. The activities supporting each step of the process vary from project to project, but are always detailed, methodical and evidence-based to ensure high-quality, safe care supported by meaningful data to demonstrate change.

Leading by Example

MHA Keystone currently coordinates three major partnerships and initiatives — *Keystone: ICU* to improve patient treatment and safety in intensive care units; *Keystone: Hospital-Associated Infections (HAI)* to reduce infections; and *Keystone: Gift of Life* to increase organ donations and save lives.

The efforts and success of the MHA Keystone Center have been recognized by ***Crain's Detroit Business*** which awarded the MHA Keystone Center a 2006 *Crain's Health Care Heroes Award* for outstanding advancement in health care. Additional accomplishments have been reported by media outlets including ***The Detroit News, Modern Healthcare, Associated Press, Detroit Free Press*** and ***Newsweek.*** Results of the *Keystone: ICU* initiative have been reported in the ***New England Journal of Medicine.***

Initiative Overview

Keystone: Intensive Care Unit (ICU)

The *Keystone: ICU* collaborative, running since 2004, now boasts 119 ICUs participating statewide to improve the quality and safety of care delivered to intensive care unit patients in Michigan. The results of the reduction — and in many cases, elimination — of infections continue to position Michigan hospitals as leaders in putting evidence-based care into practice. The MHA Keystone Center, working with the patient safety experts at Johns Hopkins University, have moved forward with new interventions for the treatment of patients with sepsis as well as improving patient and family communication to provide care for patients in all stages of ICU care.

To date, more than half the participating ICUs have lasted nearly two years without a bloodstream infection — an all-too-common infection, historically deemed largely unavoidable. Between March 2004 and December 2005, *MHA Keystone: ICU* generated significant results:

- More than 1,600 patient lives saved*
- More than 84,000 excess hospital days avoided*
- More than 185 million health care dollars saved

** These impact estimates are based on projections from the Johns Hopkins Opportunity Calculator. The model applies estimates of the prevention of deaths and decreased hospital stay as extrapolated from published empirical studies.*

Keystone: Hospital-Associated Infections (HAI)

With upwards of 90,000 deaths nationally each year, and more than $5 billion in health care expenses generated, hospital-associated infections represent one of the most significant costs in terms of human and financial consequences. Through funding provided by Blue Cross Blue Shield Michigan, the MHA Keystone Center has launched a new collaborative to address infections called *Keystone: HAI*. With the first set of evidence-based best practice focusing on hand-hygiene, prevention of urinary tract infections and bloodstream infection, more than 100 Michigan hospitals have begun to work towards the elimination of infections. Over the next two years, additional interventions will be introduced to address the prevention of ventilator-associated pneumonia and improved communication to reduce the risk of infections.

Keystone: Gift of Life

In 2006, the MHA Keystone Center continued to serve as a nexus enabling hospitals and organ procurement specialists to share best practices to increase organ donations in Michigan. As a result of the collaboration between Michigan hospitals, Michigan Gift of Life and the MHA Keystone Center, sixteen Michigan hospitals received the Department of Health and Human Services *Medal of Honor* for achieving and sustaining the national goal of a 75 percent donation rate for the past year. Overall, Michigan's statewide donation rate is 65 percent of eligible donors, as compared to 61 percent nationally. Additionally, in the interest of increased transparency and continued improvement, the MHA Keystone Center now publishes Michigan and national donation rates online at www.MHAKeystoneCenter.org.